REMARKS

The Amendments

Several amendments have been made to the claims. More specifically, Claims 1, 10, 16, and 17 have been amended. Claim 22 is cancelled. New Claims 23-37 are being added. No new matter is added by the amendments or the new claims.

Written support for the amendments to Claim 1 are found at paragraphs 0045 to 0048 wherein it is described that the inner sleeve is preferably made from PTFE and the rf suppressor material is preferably a composite of metal particles suspended in a resinous binder of the type sold under the trademark ECCOSORB. PTFE, generally sold under the trademark TEFLON, inherently has a high dielectric strength of about 500 volts/mil. See attached data sheets for TEFLON and PTFE tube products published by Fluoro-Plastics Inc. (Exhibit I). In contrast, the ECCOSORB material inherently has a high dielectric loss, thereby making it a poor dielectric material. See page 2 of the attached Glossary published the Emerson & Cuming which manufactures and produces the ECCOSORB products (Exhibit II). As described in Exhibit II, the ECCOSORB material is less dielectric in nature compared to the ECCOSTACK material produced by Emerson & Cuming. ECCOSTACK products provide dielectric strengths of up to about 500 volts/mil which is comparable to the TEFLON material. Whereas, the ECCOSORB material is known to have a dielectric strength of about 25 volts/mil and slightly above. See attached Technical Bulletin 2-6 published by Emerson & Cuming (Exhibit III). In view of the evidence presented herein, it should be apparent that the rf radiation absorptive material used in the outer shell of the Applicant's rf suppressor described and claimed in the present application, inherently has a dielectric strength that is significantly lower than the dielectric strength of the inner sleeve material described and claimed in the present application. Therefore, the introduction of the term dielectric strength in Claim 1 does not introduce any new matter because the properties are inherent in the respective materials as described and claimed.

Written support for the amendments to element b) of Claim 16 is found at paragraph 0048 of the Specification and original Claim 5.

<u>The Rejections</u>

<u>35 USC 102(b): Claims 1, 3, 6-8, 21, and 22</u>

The Examiner rejected Claims 1, 3, 6-8, 16, 21, and 22 under 35 USC 102(b) as being anticipated by the description in the background section of the present application as set forth at pages 1-10 and in Figures 1-6. In making the rejection, the Examiner did not explain why the amendments and remarks submitted by the Applicant on October 18, 2007 were not sufficient to overcome the rejection. The claims had been previously rejected on the same grounds in the Office Action mailed on February 20, 2007.

In a telephone interview with Examiner Robinson on April 22, 2008, the Applicant's undersigned attorney requested that the Examiner provide an explanation of the reasons why the amendments submitted on October 18, 2007 were not sufficient to overcome the rejection. The Examiner explained that reading Claim 1 broadly, the electrical insulating material for the inner sleeve, as set forth in the claim, was not distinguishable from the rf-suppression material for the outer shell, also set forth in the claim. The Examiner further explained that because the rf-suppression material was described as including a resinous material, the rf-suppression material inherently has at least some electrical insulating capability. He concluded, therefore, that the two materials were not distinguishable as claimed. The Examiner suggested that if the novelty of the claimed rf suppressor lies in the use of the two different materials, then the two materials should be claimed in a way that would clearly distinguish one from the other.

<u>Claim 1</u>

Claim 1 has been amended to recite that the inner sleeve is made of an electrical

insulating material that has a high dielectric strength. A high dielectric strength is able to withstand high voltage potentials across it without breaking down electrically. Such electrical breakdown is usually manifested by undesirable current conduction such as arcing. Claim 1 has also been amended to recite that outer shell is made of a radio-frequency absorbing material that has a dielectric strength that is substantially lower than the inner sleeve. An rf absorbing material necessarily includes some ferromagnetic material, such as metal particles, which significantly reduces the material's dielectric strength, making the material more susceptible to electrical breakdown when a very high potential is applied across it.

In order for a reference to anticipate a claimed invention, it must describe every element of the claimed invention. MPEP §2131. The background section (pages 1-10) of the present application and the related drawings (Figures 1-6) do not describe or show an rf radiation suppressor for a magnetron that has the combination of features set forth in Claim 1. The rf radiation suppressor described in the background section and shown in the drawings is formed from a monolithic piece of a radiation suppressing material. A common material used to make the known suppressor is a microwave absorbing material sold under the registered trademark ECCOSORB and consists of metal particles suspended in a resinous binder.

In the Applicant's claimed rf suppressor as set forth in Claim 1, the collar portion of the suppressor is formed from pieces of different materials. Each material is selected for a particular purpose. The inner sleeve (e.g., inner sleeve 702, Figs. 7A and 7B) is formed from an electrical insulating polymer that has a high dielectric strength. The high dielectric strength of the electrical insulating material inhibits the arcing problem experienced with the known rf suppressors for magnetrons. (See, paragraphs 0014 to 0017 of the Specification.) The outer shell (e.g., outer shell 704, Figs. 7A and 7B) is molded from a microwave-absorbing material such as the ECCOSORB brand of microwave-absorbing material which has a dielectric strength

that is substantially lower than the dielectric strength of the inner sleeve material.

The Applicant's claimed rf radiation suppressor is an insulated rf radiation suppressor that incorporates an inner sleeve of high dielectric strength material that can withstand the application of very high electric fields. The claimed rf radiation suppressor component is fabricated as a bi-layer composite of two parts: an insulating member shaped from a polymer material such as PTFE, and a molded rf-absorbing outer shell comprised of a suspension of iron particles in an epoxy resin and shaped by using the insulating member as part of a form to mold the rf-absorbing material. The electrically insulating inner sleeve member provides a barrier between the rf-absorbing outer shell and the magnetron cathode that prevents the rf-absorbing outer shell from contacting the magnetron cathode. That arrangement effectively prevents the arcing and electrical breakdown of the rf-absorbing material under normal voltage transients that has led to failures in the known magnetron rf suppressors.

Furthermore, the use of the high dielectric strength polymer for the electrically insulating inner sleeve makes the Applicant's claimed rf suppressor easy to produce with a high degree of precision. Moreover, because of the composite construction, the overall shape and size of the claimed rf suppressor can be essentially the same as that of the known suppressor. That means that no modifications to the magnetron or the magnetron housing are needed in order to obtain the benefits of the rf suppressor according to the present invention.

For all of the foregoing reasons, it is believed that the Applicant's claimed radio frequency radiation suppressor for an industrial magnetron is novel and not obvious relative to the rf suppressor described in the background section of the present application and shown in Figures 1 to 6 thereof.

Claim 16

The Applicant's claimed rf radiation suppressor as set forth in Claim 16 includes the

following features: "an inner sleeve member consisting essentially of an electrical insulating polymer material;" and "an outer shell coaxially assembled to said inner sleeve member, said outer shell member being made from a material that absorbs radio-frequency radiation, said radio-frequency absorbing material consisting essentially of a resin and a plurality of metal particles suspended therein." In Claim 16 as now presented, the inner sleeve member is made from an electrical insulating polymer material. The use of the phrase "consisting essentially of" excludes the presence of other materials in the inner sleeve member that would affect the properties of the electrical insulating polymer material, in particular, its high dielectric strength. Also as set forth in Claim 16, the outer shell component is made from an rf radiation absorbing material the consists essentially of a resin and a plurality of metal particles suspended in the resin. Consistent with the generally accepted meaning of "consisting essentially of", the rf radiation absorbing material excludes materials other than the resin and metal particles that would adversely affect the rf radiation absorbing property of the outer shell.

It should now be clear that the material used to make the inner sleeve member of Claim 16 is not the same as the material used to make the outer shell. Accordingly, the Applicant's claimed rf suppressor as set forth in Claim 16 is novel relative to the known rf suppressor described in the Background section of the present application.

<u>Claim 23</u>

The Applicant's claimed rf radiation suppressor as set forth in Claim 23 includes the following features: "an inner sleeve member consisting essentially of an electrical insulating polymer material" and "an outer shell assembled to said inner sleeve member, said outer shell member being made from a material that absorbs radio-frequency radiation, wherein said radio-frequency absorbing material is a composite material comprising a plurality of metal particles suspended in a resinous binder." In Claim 23, the inner sleeve member is made from an

electrical insulating polymer material. Also as set forth in Claim 23, the outer shell component is made from an rf radiation absorbing material that is a composite material which includes a plurality of metal particles suspended in a resinous binder. The use of the phrase "consisting essentially of" excludes the presence of other materials in the inner sleeve member that would affect the relevant properties of the electrical insulating polymer material. Therefore, the metal particles are excluded from the electrical insulating material of the inner sleeve because such particle would adversely affect the dielectric strength of the electrical insulating material.

It should be clear that the material used to make the inner sleeve member of Claim 23 is not the same as the material used to make the outer shell. Therefore, the Applicant's claimed rf suppressor as set forth in Claim 23 is novel relative to the known rf suppressor described in the Background section of the present application.

<u>Claim 30</u>

New Claim 30 includes the following features: "an inner sleeve member made of an electrical insulating polymer material having a dielectric strength that is sufficient to withstand an electric field transient in the vicinity of the magnetron cathode during normal operation of a magnetron" and "an outer shell assembled to said inner sleeve member, said outer shell member being made from a material that absorbs radio-frequency radiation and that has a dielectric strength that is less than sufficient to withstand said electric field transient." As discussed above, radio frequency absorbing materials generally have low dielectric strength and thus, will break down more readily in the presence of a high electric field or potential gradient.

It should be clear that the material used to make the inner sleeve member of Claim 30 is not the same as the material used to make the outer shell. Therefore, the Applicant's claimed rf suppressor as set forth in Claim 30 is novel relative to the known rf suppressor described in the

Background section of the present application.

35 USC 103(a): Claims 5 and 19

The Examiner rejected Claims 5 and 19 under 35 USC 103(a) as being unpatentable over the rf suppressor for a magnetron as described in the background section of the present application in view of US 6,225,876 (Akino et al.). In making the rejection the Examiner stated: "The admitted prior art discloses a magnetron suppressor but fails to show metal particles suspended in binder. Akino discloses a feed-through EMI filter with a metal-flake composite material that shows a metal dispersed in a binder material. It would have been obvious to one of ordinary skill to use a suspended metal so as to produce a shielding effect." The Applicant traverses this rejection for the following reasons.

As discussed above relative to Claims 1, 16, 23, and 30 the Applicant's claimed rf radiation suppressor includes two components: an inner sleeve member made of an electrical insulating material that has a high dielectric strength and an outer shell assembled to the inner sleeve member. The outer shell member is made of a material that absorbs radio-frequency radiation. The background section of the present application does not describe that combination of features. The known magnetron rf suppressor has a collar-like structure that is formed exclusively of a material that absorbs rf radiation. It does not include an inner sleeve member that is made of an electrical insulating material as set forth in any of Claims 1, 16, 23, and 30.

Akino et al. does not does not describe or suggest the use of an electrical insulation sleeve member that could be assembled to the known magnetron rf suppressor. The proposed combination of references would not teach all of the features of the Applicant's claimed rf suppressor as set forth in Claim 1, Claim 16, Claim 23, or Claim 30. Therefore, the proposed combination does anticipate the Applicant's claimed rf suppressor as set forth in either Claim 5

which depends from Claim 1, Claim 16 which incorporates the feature of Claim 19 (Cancelled), or Claim 23 which includes the feature that the outer shell is a composite material comprising a plurality of metal particles suspended in a resinous binder. Accordingly, the combination of references relied on by the Examiner fails to raise a *prima facie* case of unpatentability relative to Claims 5, 16, and 23.

For all of these reasons, it is believed that Claims 5, 16, and 23 are allowable over the proposed combination of references.

<u>The Dependent Claims</u>

Claims 3 to 8, 10, and 21 depend from Claim 1 either directly or indirectly and thus include all of the features set forth in Claim 1. Therefore, Claims 3 to 8, 10, and 21 are allowable for at least the same reasons as Claim 1.

Claims 17, 18, and 20 depend from Claim 16 either directly or indirectly and thus include all of the features set forth in Claim 16. Therefore, Claims 17, 18, and 20 are allowable for at least the same reasons as Claim 16.

Claims 24 to 29 depend from Claim 23 either directly or indirectly and thus include all of the features set forth in Claim 23. Therefore, Claims 24 to 29 are allowable for at least the same reasons as Claim 23.

Claims 31 to 37 depend from Claim 30 either directly or indirectly and thus include all of the features set forth in Claim 30. Therefore, Claims 31 to 37 are allowable for at least the same reasons as Claim 30.

CONCLUSION

In view of the foregoing amendments and remarks, it is believed that all of the claims pending in this application are in condition for allowance. The Applicant respectfully requests that the Examiner reconsider the application in the light of the amendments and remarks presented herein.

Respectfully submitted,

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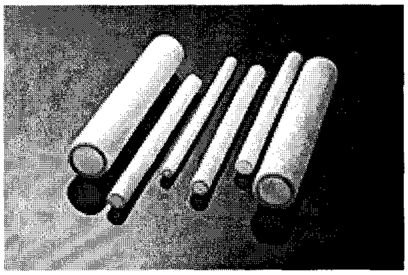
Enclosures: Exhibits I, II, and III

EXHIBIT I

Fluoro-Plastics, Inc.
3601 G Street, Philadelphia, PA 19134
Toll Free: 800-262-1910 • Telephone: 215-425-5500 • Fax: 215-425-5521
E-Mail: Fluoro@Fluoro-Plastics.com • Website: www.Fluoro-Plastics.com

EXTRUDED TUBE TEFLON ® AND PTFE

Check up to five results to perform an action.



larger image

Surf Technologies is a leader in the manufacture of heavy walled PTFE tube, both in standard inch sizes and in AWG sizes. Tube is used in fluid handling applications for high temperature acids and caustics or where contamination is an issue, such as in wire braided hose. In applications where PTFE's excellent insulating properties are needed heavy walled tube is the shape of choice, e.g. in spark plugs for stationary generators, coaxial spacers, connectors,. Because drilling a precise hole in longer PTFE lengths is impossible, extruded tube is the best way to insure uniform wall thickness throughout the length of the tube. Various fillers are available to modify the properties of PTFE to meet application requirements. Meets ASTM D 3295

Surf Technologies extrudes multi-hole tube for the electrical components industry and other users who need multiple tubing cavities. Tube can have two, three, four or five holes for coaxial cable applications, standoffs, and other applications where insulating properties are critical.

Teflon® is a registered trademark of E.I. Du Pont De Nemours and Company used under License by Fluoro-Plastics, Inc. Only Dupont makes TEFLON®.

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Item #	Product Name	ID	OD	Length	Specification Sheet	Material Type	Tensile Strength	Elongation at Break	Dielectric Strength,i.e. - Breakdown voltage	List Price
VT1/16A	VIRGIN TUBE 1/16" ID X 1/4" OD	1/16"	1/4"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/2A	VIRGIN TUBE 1/2" ID X 5/8" OD	1/2"	5/8"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/2B	VIRGIN TUBE 1/2" ID X 11/16" OD	1/2"	11/16"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/2C	VIRGIN TUBE 1/2" ID X 3/4" OD	1/2"	3/4"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/2D	VIRGIN TUBE 1/2" ID X 7/8" OD	1/2"	7/8"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/2E	VIRGIN TUBE 1/2" ID X 1" OD	1/2"	1"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
	VIRGIN TUBE			6 AND	AMS3651 /	Standard	> 1500		500 volts per	

VT1/2F	1/2" ID X 1-1/8"OD	1/2"	1-1/8"	12 FOOT	MIL-P19468	PTFE	psi	200% +/-	mil	QUOTE
VT1/2G	VIRGIN TUBE 1/2" ID X 1-1/4"OD	1/2"	1-1/4"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/2H	VIRGIN TUBE 1/2" ID X 1-3/8"OD	1/2"	1-3/8"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/2I	VIRGIN TUBE 1/2"ID X 1-1/2" OD	1/2"	1-1/2"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/2J	VIRGIN TUBE 1/2" ID X 1-3/4"OD	1/2"	1-3/4"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/4A	VIRGIN TUBE 1/4" ID X 3/8" OD	1/4"	3/8"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/4B	VIRGIN TUBE 1/4" ID X 1/2" OD	1/4"	1/2"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/4C	VIRGIN TUBE 1/4" ID X 9/16" OD	1/4"	9/16"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/4D	VIRGIN TUBE 1/4" ID X 5/8" OD	1/4"	5/8"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/4E	VIRGIN TUBE 1/4" ID X 3/4" OD	1/4"	3/4"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/4F	VIRGIN TUBE 1/4" ID X 7/8" OD	1/4"	7/8"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/4G	VIRGIN TUBE 1/4" ID X 1" OD	1/4"	1"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/4H	VIRGIN TUBE 1/4" ID X 1-1/4"OD	1/4"	1-1/4"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/4I	VIRGIN TUBE 1/4" ID X 1-3/8"OD	1/4"	1-3/8"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/8A	VIRGIN TUBE 1/8" ID X	1/8"	1/4"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE

	1/4" OD									
VT1/8B	VIRGIN TUBE 1/8" ID X 3/8" OD	1/8"	3/8"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/8C	VIRGIN TUBE 1/8" ID X 1/2" OD	1/8"	1/2"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/8D	VIRGIN TUBE 1/8" ID X 9/16" OD	1/8"	9/16"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE
VT1/8E	VIRGIN TUBE 1/8" ID X 5/8" OD	1/8"	5/8"	6 AND 12 FOOT	AMS3651 / MIL-P19468	Standard PTFE	> 1500 psi	200% +/-	500 volts per mil	QUOTE

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EXHIBIT II

Glossary

Microwave Terminology and E&C Verbiage Glossary

AN/SPY-1
AN/SPY-1 is a US naval radar system manufactured by Lockheed Martin. The array is a passive electronically scanned system, it is a key component of the Aegis combat system. The system is computer controlled, using four complementary antennae in order to provide full 360 degree coverage.

ANECHOIC
Away from echo, i.e. absorbing

ANECHOIC RANGE TERMINAL
A five-sided anechoic chamber surrounding the quiet zone of an outdoor range. Such a facility provides useful reduction of reflection that would otherwise compromise measurement accuracy.

ANGLE OF INCIDENCE
The angle measured from a perpendicular axis to the plane of a surface which energy arrives at. "Normal incidence" refers to the perpendicular direction of propagation to the surface. "Grazing Incidence" refers to energy arriving from the direction almost parallel to the surface (high incident angle"). Important in the performance of specular absorbers.

ANTENNA
A device which increases the efficiency of transmission or reception of radio or radar signals into or from a medium. For instance, transmitting and receiving antennas are the same device.

ANTENNA DIRECTIVITY
Refers to the angle range over which an antenna enhances the signal level.

ANTENNA GAIN
The ability of an antenna to "magnify" the energy received from the desired direction.

ANTENNA PATTERN
Refers to the variation in radiated field strength (or received signal levels) found as an antenna is rotated. When the antenna is rotated in a horizontal plane, this variation is called the "azimuth antenna pattern." When the rotation is in elevation angle, it is called "elevation antenna pattern."

ATTENUATION
Loss of energy (i.e. conversion to heat) as radiation passes through a lossy (absorptive) medium (expressed in dB). Function of the properties of the medium. In contrast to insertion loss or reflectivity.

BROAD BAND ABSORBER
Wide range of frequencies. Broad band absorbers are useful over a wide range of frequencies. The thickness of the absorber determines the lowest frequency at which it is effective.

CJR
AN/SPQ-11 Cobra Judy is a passive electronically scanned array (PESA) radar, which has a central RF source (such as a magnetron, a klystron or a travelling wave tube), sending energy into (usually digitally-controlled) phase shift modules, which then send energy into the various emitting elements in the front of the antenna, found on the Observation Island-class missile range instrumentation ships.

COAXIAL LINE
A pipe (so called outer conductor) with a concentric wire (inner conductor) that is used to carry microwave energy with little loss of power.

COMPACT RANGE
The company, Scientific Atlanta, offers what they refer to as a "Compact Range". Basically it is a large 16'x 16' section of a parabolic reflector which, when properly used to reflect energy, makes it appear that this energy had originated at infinity. One can therefore measure antenna patterns and radar cross section patterns at short transmission lengths which otherwise would require large transmission distances. Such a range is located in an anechoic chamber to avoid reflection.

COMPATIBILITY
Refers to the problem of a transmitter on a device causing interference to a receiver, or receivers on the same device (such as may be encountered on satellites, aircraft, or automotive vehicles).

CONDUCTIVITY GRADIENT
An absorber in which the dielectric properties effectively vary as the radiation passes through the absorber. This is accomplished by stacking layers having different dielectric properties (ECCOSORB AN, ANW).

dB Down
The portion of incident energy which is reflected from a surface. A flat metal surface reflects all incident radiation. Measured in dB which is a logarithmic measure of the portion of energy reflected as compared to that reflected from a flat metal plate of the same area. A metal plate has a reflectivity of 0 dB down. A material which reflects half of the incident energy is 3 dB down or has a reflectivity of -3 dB. A material which reflects one tenth of the incident energy has a reflectivity of -10 dB Reflectivity (%) dB down. For flat sheet absorbers, 20 dB down is generally the best possible and desired performance.

DECIBEL
A logarithmic ratio (base 10) between two quantities denoted as ""dB."" In terms of energy reflection: dB = 10 x LOG(power reflected/power reflected by metal plate) e.g. dB = 10 x LOG(1/2) = -3 (50% reflected power)

DIE CUT
Die cutting is the term used to define the process of cutting material from a larger sheet into the desired shape and size. This is done using a die, a press, and material. The die consists of a die board, usually made from plywood, and steel rule, which is inserted into the die board in the desired configuration. The resulting die is put into a press in such a way that the sharp edges of the die penetrate through the material and cut it out of a larger sheet into the shape made with the steel rule.

DIELECTRIC
A medium through which electric attraction or repulsion may be sustained - an insulator.

DIELECTRIC CONSTANT
The ratio of the capacitance (ability to store electrical energy) of a condenser filled with the material in question to that of the same condenser filled with vacuum.

DIELECTRIC LOSS
The power loss in a dielectric due to heating as a wave passes through it. It can be expressed as "dielectric loss tangent" (power factor) or "loss factor". Low loss makes a good dielectric (ECCOSTOCK dielectric materials). High loss is an absorber (ECCOSORB), poor dielectric.

DIELECTRIC MATERIALS
Materials which store and/or dissipate electric and/or magnetic energy. ECCOSTOCK

DIPOLE ANTENNA

EXHIBIT III

TECHNICAL BULLETIN 2-6

ECCOSORB® MF

Machinable Rod, Bar, and Sheet Stock With Lossy Magnetic Loading

W. R. Grace & Co.
Canton, Massachusetts 02021 U.S.A.
Telephone (617) 828-3300

COOSORB MF is a series of magnetically loaded epoxide rod, ar, and sheet materials, which are widely used as absorbers, ttenuators, and terminations in waveguides and coaxial lines. here are also applications in antenna elements and in certain ree-space absorbers. In products such as these, it is necessary to be conversant with the dielectric and magnetic properties of the materials, which are therefore listed on the ack side of this sheet. For simplification and convenience n use, these listings are in values normalized with respect o free space.

ost of the symbology, definitions, and equations are included n Reference 1.* In addition, in this Technical Bulletin, M' s used for the real part of the magnetic permeability and M" or the magnetic loss factor. Beyond the definitions in Reference 1, the following clarification of the terms dB/CM or B/IN and $|Z|/Z_0$ is offered. These characteristics are not in hemselves directly applicable to the calculation of transmission and reflection coefficients as they are defined on ages 3 & 4 of Reference 1. For these calculations, the complex dielectric constant (K'-jK'tan D) and complex magnetic ermeability (M'-jM'tan M) are used as listed in the Tables. he definition of dB/unit length is included in Reference 1, oth in mathematical form and in words. The value is useful n comparing one material against another to determine which ffers the most loss independent of interface reflection oefficients. Similarly, $|Z|/Z_0$, the normalized impedance agnitude ratio, can be used as a qualitative measure of the mpedance match between free space and the material; as a uality factor, an impedance ratio which is closest to 1 is he most desirable because at a value of 1 the impedance atch between the material and free space is perfect.

ith this revision of the Technical Bulletin on ECCOSORB MF, merson & Cuming announces the acquisition of the 4101 line f lossy magnetic materials previously offered by another anufacturer. This line included versions with the following ttenuations at 10 GHz:

n dB/inch: 20, 30, 40, 60, 80, 85, 100, 125, 175, and 190

n dB/cm.: 8, 12, 16, 24, 31, 33, 39, 49, 69, and 75

ith the exception of the 175 and 190 dB/inch versions, all embers of this newly acquired product line will be discontinued as standard products, and customers are urged to substitute the closest equivalent member of the current Eccosorb F series. On the other hand, in cases where the customer ust have one of the discontinued versions because of previous production specification commitments, Emerson & Cuming ill manufacture these on special order if a sufficient uantity is requested. The 175 and 190 dB/inch versions will e designated Eccosorb MF175 and Eccosorb MF190 respectively.

THER ELECTRICAL PROPERTIES

olume Resistivity	$>10^{11}$ ohm-cm
ielectric Strength	>25 volts/mil (1.0 kv/mm)

PHYSICAL PROPERTIES

Color	Gray
Service Temperature, °C	to 180
Density, g/cc	1.6 to 4.0
Durometer, Shore D	85
Tensile Strength, psi (kg/sq.cm)	>8000 (560)
Thermal Expansion per °C	~30 x 10^{-6}
Thermal Conductivity, (BTU)(in)/(hr)(ft^2)(°F)	~10.0
(cal)(cm)/(sec)(cm^2)(°C)	~0.003
Water Absorption, %, 24 hrs.	<0.1
Outdoor Exposure Tolerance	Good
Machinability	Good

Since Eccosorb MF materials constitute a series with widely different electrical properties, some small variations from the given physical properties can be expected.

LOW-FREQUENCY APPLICATIONS

At radio frequencies, Eccosorb MF has been used effectively as a high-Q inductor-core material in such devices as slug tuners. The material is useful also in many other magnetic components. Simple RF filters can be formed for example, by passing vacuum tube filament leads through small blocks of Eccosorb MF, or by casting appropriate sections of the material around such leads by using one of the electrically equivalent castable versions. (See "Related E&C Products").

*REFERENCE 1.: "ENERGY PROPAGATION IN DIELECTRIC AND MAGNETIC MATERIALS," located at the beginning of the ECCOSORB SECTION. This is an Emerson & Cuming Publication dated September 1965.